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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/839,097	04/20/2001	Ashish Verma	JP920000446US1	1738

7590 03/03/2004

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EXAMINER

WEST, JEFFREY R

ART UNIT	PAPER NUMBER
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2857

DATE MAILED: 03/03/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/839,097	Applicant(s) VERMA ET AL.	
	Examiner Jeffrey R. West	Art Unit 2857	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 November 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 14-26 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 14-26 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 November 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 101

1. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

2. Claims 14-26 are rejected under 35 U.S.C. 101 because the claimed invention lacks patentable practical application.

Apart from the utility requirement of 35 U.S.C. 101, usefulness under the patent eligibility standard requires significant functionality to be present to satisfy the useful result aspect of the practical application requirement. See *Arrhythmia*, 958 F.2d at 1057, 22 USPQ2d at 1036. The mere fact that the claim may satisfy the utility requirement of 35 U.S.C. 101 does not mean that a useful result is achieved under the practical application requirement. The claimed invention as a whole must produce a “useful, concrete and tangible” result to have a practical application. A process that consists solely of the manipulation of an abstract idea is not concrete or tangible. See *In re Warmerdam*, 33 F.3d 1354, 1360, 31 USPQ2d 1754, 1759 (Fed. Cir. 1994). See also *Schrader*, 22 F.3d at 295, 30 USPQ2d at 1459.

Although the application discloses the intended use of the invention for “classification applications such as, for example, medical imaging, biometric verification, signature or fingerprint recognition, robot vision, speech recognition, image retrieval, expert systems, etc.,” the claimed invention supplies the method in terms of abstract ideas and fails to provide a concrete

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and tangible result. Independent claims 14, 20, and 26 describe a method/program for carrying out a method/apparatus for "determining a manner of classifying a sample in one of a number of predetermined classes." The claimed invention never describes a "real world" method of using the results of the mathematical process. The claimed result is described designating an undefined sample with an undefined class, and does not physically use the result for any purpose. These problems suggest that the method of the current invention is abstract data manipulation that does not produce a useful, tangible, and concrete result in its current form.

Claims 15-19 and 21-25 are rejected under 35 U.S.C. 101 because they incorporate, and fail to correct, the lack of practical application present in parent claims 14, 20, and 26.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 14, 20, and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,539,353 to Jiang et al.

Jiang discloses a method for performing confidence measures using sub-word-dependent weighting of sub-word confidence scores for robust speech

recognition comprising computing a weight (i.e. a and/or b) for each of a plurality of classifiers (i.e. $f_{\text{class}}(U_i)$) (column 6, lines 10-17), wherein the classifiers indicate a manner of classifying a sample in one of a number of predetermined classes (column 6, lines 4-5), calculating for each of a the predetermined classes a weighted summation/confidence summation (i.e. the summation of $f_{\text{class}}(U_i)(x_i)$) across the classifiers of a likelihood that the speech sample belongs to a particular class, weighted by said weight value, (column 5, line 53 to column 6, line 1), and designating the speech sample as belonging to the class for which the weighted summation confidence measurement indicates (i.e. successfully fitting into one of the predetermined classes) (column 6, lines 18-23 and 38-44).

Jiang discloses that the weight value (i.e. a and/or b) for a classifier, specific to each class with corresponding weights specific to each class and therefore specific to each classifier, comprises a sample confidence component (column 7, lines 1-10) calculated, in the same manner as above (column 7, lines 13-18), as a weighted summation/confidence summation (i.e. the summation of $f_{\text{class}}(U_i)(x_i)$), and a cumulative component comprising a mean, (i.e. $CS(w)$), of the weighted summation/confidence summation across the classifiers, (i.e. $f_{\text{class}}(U_i)$), of the log likelihoods (i.e. x_i) over a plurality of samples (i.e. a 1 to N) (column 5, line 53 to column 6, line 1).

Further, since $CS(w)$ is a cumulative mean of the confidence levels of the speech samples over time, it is considered inherent that the cumulative mean

is successively updated with the sample confidence since the cumulative mean summation is the summation of each new confidence level obtained.

Jiang also discloses performing the method using an input means to receive data (column 3, lines 3-12) and a processor means, with associated code stored on a computer readable medium, for executing the processing (column 2, lines 30-35 and 44-56).

Although the invention of Jiang doesn't specifically disclose determining if the weighted summation of likelihoods is greatest in value, it would have been obvious to one having ordinary skill in the art to include this comparison, because Jiang does disclose a functionally equivalent method for determining the correct class for a speech sample by defining a threshold indicating a low level that the weighted summation must exceed in order to contain a high enough confidence, and the combination would have provided a similar method with more detailed results that allowed for the user to obtain a plurality of quantitative summation results thereby presenting to the user not only what class the sample belongs to, but also what classes the sample is similar to, offering comparisons between samples.

5. Claims 15-19 and 21-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jiang in view of U.S. Patent No. 5,880,767 to Liu.

As noted above, the invention of Jiang teaches many of the features of the claimed invention including calculating a metric of relative confidence as a weighted summation, and a corresponding running average, over a plurality

of log-likelihoods, but doesn't specifically provide that the weighting is derived from a linear combination of an order statistic with the linear combination comprising a difference between the most likely and second most likely choices.

Lui teaches a perceptual image resolution enhancement system for processing and sharpening various types of images by filtering the input image to extract a plurality of components (column 1, lines 41-56) and classifying the data for adaptive sharpening of the image (column 2, lines 17-28) wherein the filtering is carried out using an nonlinear order static filter (i.e. L-filter) for weighting the components as a sum of the defined coefficients multiplied by ascendingly/descendingly ordered data (column 5, lines 10-25).

With respect to the limitation requiring that the linear combination comprising a difference between the most likely and second most likely choices, the invention of Liu only provides coefficients for the first two terms, and 0 for the rest of the terms, therefore providing a difference between the first and second choices that are most likely.

It would have been obvious to one having ordinary skill in the art to modify the invention of Jiang to provide that the weighting is derived from a linear combination of an order statistic, as taught by Liu, because Liu suggests that the combination would have provided a method for calculating the weighting values disclosed by Jiang, that, as suggested by the equation, allows the user to control the accuracy of the weighting through the application of the highest weight to the most important values during each use of the filter by first

defining the filter with the highest weights as the first coefficients and then ordering the values so that the most important values correspond to these first coefficients (column 5, lines 10-25).

Response to Arguments

6. Applicant's arguments filed November 21, 2003, have been fully considered but they are not persuasive.

As a preliminary matter, the drawings filed with the instant response have overcome the outstanding objection to the drawings filed April 20, 2001.

Applicant first argues, with respect to the rejection under 35 U.S.C. 101, that "the specification clearly articulates a useful and novel use of the invention as it relates to audiovisual speech recognition. More specifically, the Applicants refer to page 5 line 20 to page 8 line 3 of the specification as originally filed (and corresponding paragraphs in the substitute specification filed herewith) which fully, completely, and unequivocally describe improvement in phonetic classification achieved by practicing and implementing the invention in that context."

The Examiner agrees that the specification provides a specific use for the invention thereby giving the invention utility. However, as noted in the Office Action mailed August 18, 2003, "[t]he mere fact that the claim may satisfy the utility requirement of 35 U.S.C. 101 does not mean that a useful result is achieved under the practical application requirement. The claimed invention

as a whole must produce a 'useful, concrete and tangible' result to have a practical application." Independent claims 14, 20, and 26 do not produce such a "concrete and tangible" result since these claims only result in a designation and contain no concrete application based upon the designation.

Applicant then argues that, in view of the newly added claims, neither Jiang nor Liu teaches the invention as claimed. The Examiner notes that the originally filed and the claims as currently amended contain very similar limitations. The Examiner also asserts that the invention of Jiang does disclose a method for performing confidence measures using sub-word-dependent weighting of sub-word confidence scores for robust speech recognition comprising computing a weight (i.e. a and/or b) for each of a plurality of classifiers (i.e. $f_{\text{class}}(U_i)$ classifiers specific to each class with corresponding weights specific to each class and therefore specific to each classifier) (column 6, lines 10-17), wherein the classifiers indicate a manner of classifying a sample in one of a number of predetermined classes (column 6, lines 4-5), calculating for each of a the predetermined classes a weighted summation/confidence summation (i.e. the summation of $f_{\text{class}}(U_i)(x_i)$) across the classifiers of a likelihood that the speech sample belongs to a particular class, weighted by said weight value, (column 5, line 53 to column 6, line 1), and designating the speech sample as belonging to the class for which the weighted summation confidence measurement indicates (i.e. successfully

fitting into one of the predetermined classes) (column 6, lines 18-23 and 38-44).

Further, while Applicant has not challenged the Examiners notice that it would have been obvious to one having ordinary skill in the art to determine if the weighted summation of likelihoods is greatest in value as opposed to the functionally equivalent method for determining the correct class for a speech sample by defining a threshold indicating a low level that the weighted summation must exceed in order to contain a high enough confidence, the Examiner further includes U.S. Patent No. 3,643,215 to Ingham et al., for Applicant's consideration, which teaches that it is well-known in the art to designate features as belonging to a predetermined class by developing a confidence level for a plurality of likelihoods and indicating the class with the greatest confidence level above a threshold (column 5, lines 47-65).

Applicant then argues that "the weights used by Jiang (the function $f_{\text{class}(U_i)}(x_i)$ in column 5, equation 1, line 60) are decided a priori and they are kept constant during the experiment. There is no technique mentioned as to how these weights can be determined during the experiment, which is one of the important contributions of the claimed invention. In fact, determining these weights during the experiment allows one the ability to adapt the weight from sample to sample during the experiment."

The Examiner asserts that the function $f_{\text{class}(U_i)}(x_i)$ in Jiang is not the weight value itself, but instead is a confidence measure based upon a

plurality of weights (column 6, lines 6-17) calculated as a weighted summation/confidence summation (i.e. the summation of $f_{\text{class}}(U_i)(x_i)$), and a cumulative component comprising a mean, (i.e. $CS(w)$), of the weighted summation/confidence summation across the classifiers, (i.e. $f_{\text{class}}(U_i)$), of the log likelihoods (i.e. x_i) over a plurality of samples (i.e. a 1 to N) (column 5, line 53 to column 6, line 1 and column 7, lines 13-18).

Applicant also argues that "Liu is not related to the claimed invention, and decision fusion in general, as the image pixel values are something inherent to the input data while in a decision fusion experiment the order statistic is of the outcomes of the classifiers after their application on the data." The Examiner maintains that Liu is related to the claimed invention because Liu teaches a method for classifying data for adaptive image sharpening (column 2, lines 17-28) and the filtering method of Liu would be applicable in Jiang by using a nonlinear order static filter for weighting the components as a sum of the defined coefficients multiplied by ascendingly/descendingly ordered data to allow the user to control the accuracy of the weighting through the application of the highest weight to the most important values during each use of the filter.

Applicant then states that "the discrimination [in the instant invention] is expressed as the L-statistic of the likelihoods for various classes given by the

classifier. Since this discrimination can be measured for each sample, it is possible to evaluate the confidence of a classifier adaptively during the experiment. In the very useful context of audiovisual speech recognition experiments performed in accordance with the invention, the claimed approach achieves much better results as compared to using static weights, as in Jiang, for audio and video.”

The Examiner first asserts that the invention of Jiang does disclose determining confidence indications for each speech sample (column 6, lines 24-28). Secondly, in the quoted section, Applicant presents several features of the instant invention, but has not specifically pointed out how the language of the claims patentably distinguishes them from the references.

Applicant then states that “a cumulative measure of the above mentioned discrimination among classes reflects the overall confidence of the classifier, which can form the static part of the classifier confidence during the experiment. Clearly, the approach provided by the claimed invention is absent from the cited prior art of record. Therefore, the claimed invention is patentable distinct over both Jiang and Liu.” Again, this passage presents several features of the instant invention, but does not specifically point out how the language of the claims patentably distinguishes them from the references.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to

Applicant's disclosure:

U.S. Patent No. 3,643,215 to Ingham et al. teaches a pattern recognition device in which allowance is made for pattern errors wherein features are designated as belonging to a predetermined class by developing a confidence level for a plurality of likelihoods and indicating the class with the greatest confidence level above a threshold (column 5, lines 47-65).

U.S. Patent Application Publication No. 2002/0010691 to Chen teaches an apparatus and method for fuzzy analysis of statistical evidence.

Choudhury et al., "Multimodal Person Recognition using Unconstrained Audio and Video" discloses a multi-modal integration unit comprising means for receiving from each of a plurality of sensing devices, comprising video and audio devices and an associated plurality of processors/face and speech classifiers, a respective set or characterization pairs, each characterization pair comprising a respective candidate characterization and a respective confidence indication relating to the respective candidate characterization, and means for processing the sets of characterization pairs and to supply at least one final characterization of signals received at the sensing devices, which final characterization is chosen from at least one of the characterization pairs.

8. Applicant's amendment necessitated the new ground(s) of rejection

presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.


9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeffrey R. West whose telephone number is (703)308-1309. The examiner can normally be reached on Monday through Friday, 8:00-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marc S. Hoff can be reached on (703)308-1677. The fax phone numbers for the organization where this application or proceeding is assigned are (703)308-7382 for regular communications and (703)308-7382 for After Final communications.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0956.

jrw
February 12, 2004


MARC S. HOFF
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800